Curriculum Committee Meeting Agenda

Voting Committee Members

Pam Morse (Chair)	Linnea Jaeger	John Schoppert
Kristen Booth	Doris Jepson (Vice Chair)	Stephen Shwiff
P.K. Hoffman	Zip Krummel	
Katy Jablonski	Emilie Miller	

Non-Voting Committee Members

Susan Lewis (Curriculum)

Dawn Sallee-Justesen (Student Services)

Support Staff

Gail Gilliland (Curriculum)

Guests

John Evans

February 1, 2018 3:30 am – 5:00 pm
The Dalles Campus, room 3.218 (student services conference room)
Hood River Campus, room 1.209 (conference room)

Information items (no voting required):

1. none

Business:

1. Approval of January 18, 2018 minutes [1]

Submissions [2] (times are estimates):

1. John Evans (3:35 – 4:00 pm)
    - MTH 105 Math in Society (Gen Ed CLO update)
    - MTH 111 College Algebra (Gen Ed CLO update)
    - MTH 112 Elementary Functions (Gen Ed CLO update)
    - MTH 243 Statistics I (Gen Ed CLO update)
    - MTH 244 Statistics II (Gen Ed CLO update)
    - MTH 251 Calculus I (Gen Ed CLO update)
    - MTH 252 Calculus II (Gen Ed CLO update)
    - MTH 253 Calculus III (Gen Ed CLO update)

Discussion Items:

1. Definitions of "In-Depth" and "Minimally" (Kristen & P.K.: 4:00 – 4:55 pm)

Next Meeting: February 15, 2018

Attachments: [1]January 18, 2018 minutes; [2]Submissions: 8 Gen Ed CLO updates.

Curriculum Committee Minutes
January 18, 2018
3:30pm – 5:00pm
Location: TDC Room 3.218 (SS Conference Room) and Hood River Room 1.209 (conference room)

PRESENT

Voting Committee Members

Pam Morse (Chair)
Kristen Booth
P.K. Hoffman
Katy Jablonski (phone)
Linnea Jaeger
Doris Jepson (Vice Chair)
Zip Krummel
Emilie Miller
Stephen Shwiff

Non-Voting Committee Members

Susan Lewis (Curriculum)

Support Staff

Gail Gilliland (Curriculum)

Guests

Suzanne Burd
Gabriela Martinez Mercier
Chris Spangler

ABSENT

Voting Committee Members

John Schoppert

Non-Voting Committee Members

Dawn Sallee-Justesen (Student Services)

Item	Discussion	Action
Call to Order	Meeting called to order by Pam at 3:30pm	
Informational item:	There were no informational items presented.	
Business		
	Motion: approve December 7, 2017 minutes as written	Motion: Stephen 2nd: Linnea Action: 7 in favor – 0 opposed – 0 abstentions
Submissions		

MEC 123 Industrial Mechanical Systems (New CTE Course)	Chris Spangler represented the EM-Tech department answering questions about MEC 123. MEC 123 is replacing MEC 121 and MEC 122. Only 50% or less of students go into the wind industry. With this change it will offer students an opportunity to select their own area of focus. The required placement of the course in a degree and/or certificate will be presented at a later CC meeting this year. Until then, the course will be on hold. **Motion: approve as written pending approval of placement in degree and/or certificate**	Motion: Doris 2nd Linea Action: 7 in favor – 0 opposed – 0 abstentions
NCT 50 Realizing Your Potential (New NCTC Course)	Suzanne Burd answered questions about the NCT 50 course and noncredit training certificate. The course is noncredit; however, it is transcripted. The certificate is a 1 course certificate. CGCC has been offering this course for about 2 years through a contract with the Department of Human Services for DHS students. The contract with DHS will end in about 2 months. At that time Pre-College will offer the course for a yet to be determined price – possibly the Pre-College rate of $25 per term. The course is part of the Pre-college recruiting activities. The students taking this course are generally not ready for Pre-College courses. Suzanne will be meeting with DHS this next week to discuss the contract. DHS probably will not want to take it on again. However, they may choose to purchase seat space from CGCC. **Motion: approve as written**	Motion: Katy 2nd Kristen Action: 7 in favor – 0 opposed – 0 abstentions

Realizing Your Potential (New NCTC)	**Motion: approve as written**	Motion: Stephen 2nd Linnea Action: 7 in favor – 0 opposed – 0 abstentions
LIB 101 Library Research and Beyond: Find, Select, and Cite (Course Rev: title, des, out)	Gabriella Martinez Mercier answered questions about LIB 101. This course does not have any prerequisites and students did well in it. It is meant to be an entry level course similar to a Career Guidance course. It is one of the Oregon Promise course options to fulfill the CG requirement. The outcomes are taken directly from the AAOT Information Literacy outcomes. **Motion: approve as written**	Motion: Emilie 2nd Stephen Action: 7 in favor – 0 opposed – 0 abstentions
ART 252 Ceramics I (Gen Ed Request)	Susan, acting as interim Arts and Humanities Department Chair, answered questions about the Arts and Humanities courses that are being submitted for Gen Ed status approval and CLO update. Zip arrived. Zip will be replacing Stephen, representing the Social Science department. Stephen will be replacing Tom, representing the CTE department. Due to schedule conflicts, Tom will not be on the CC for the remainder of 2017-18. Brief discussion took place regarding the measuring of "understanding". With course outcomes "understanding" is the student's ability to demonstrate once completing the course.	Motion: Stephen 2nd Emilie Action: 8 in favor – 0 opposed – 0 abstentions

	Previously the CC has approved the use of "appreciate" and "understanding." For these ART submissions, course outcomes were previously approved. These submissions are now requesting Gen Ed status. To have Gen Ed approval the first two CLO's must be taught "In-Depth" with at least one more CLO being taught "in-depth" or "Minimally". **Motion: approve as written**	
ART 255 Ceramics II (Gen Ed Request)	**Motion: approve as written**	Motion: Linea 2nd Stephen Action: 8 in favor – 0 opposed – 0 abstentions
ART 230 Drawing I (Gen Ed CLO update)	With the addition of the new quantitative literacy (computation) CLO, courses with Gen Ed status are required to be brought through the CC again. **Motion: approve as written**	Motion: Kristen 2nd Katy Action: 8 in favor – 0 opposed – 0 abstentions
ART 269 Printmaking I (Gen Ed CLO update)	Communicate will reach the "In-Depth" level. **Motion: approve as written**	Motion: Stephen 2nd Linnea Action:8 in favor – 0 opposed – 0 abstentions
ART 286 Watercolor I (Gen Ed CLO update)	**Motion: approve as written**	Motion: Katy 2nd Doris Action: 8 in favor – 0 opposed – 0 abstentions

MUS 108 Music Cultures of the World (Gen Ed CLO update)	**Motion: approve as written**	Motion: Doris 2nd Emilie Action: 8 in favor – 0 opposed – 0 abstentions
MUS 110 Fundamentals of Music (Gen Ed CLO update)	**Motion: approve as written**	Motion: Katy 2nd Linnea Action: 8 in favor – 0 opposed – 0 abstentions
PHL 201 Introduction to Philosophy: Philosophical Problems (Gen Ed CLO update)	**Motion: approve as written**	Motion: Doris 2nd Stephen Action:8 in favor – 0 opposed – 0 abstentions
PHL 202 Introduction to Philosophy: Elementary Ethics (Gen Ed CLO update)	Additional content has been added, however the CLOs are still "In-Depth". The philosophy courses are not currently being taught, but are still on the books. **Motion: approve as written**	Motion: Katy 2nd Linnea Action: 8 in favor – 0 opposed – 0 abstentions
PHL 204 Philosophy of Religion (Gen Ed CLO update)	Revisions to the response included: an added outcome that also addresses the CLO, and some further explanation of how content addressed the CLO. **Motion: approve as written**	Motion: Doris 2nd Kristen Action: 8 in favor – 0 opposed – 0 abstentions
TA 274 Theatre History (Gen Ed CLO update)	The previous responses providing descriptions of how the content addressed the CLO were a bit brief, so more information has been added to the make it more robust. **Motion: approve as written**	Motion: Zip 2nd Linnea Action: 8 in favor – 0 opposed – 0 abstentions

Discussion Items:		
Definitions of "In-Depth" and "Minimally"	Kristen and PK lead the discussion on the definitions of "In-Depth" and "Minimally". Katy's information was distributed to the CC. Review of Gen Ed designation requirements as written today: • The first two CLO's, "communication" and "critical thinking and problem solving" must be addressed "In depth." • At lease one of the remaining CLOs (3, 4 & 5) must be addressed at least minimally. Definition of "in depth" has been agreed upon at previous meeting. Definition of "minimally" under discussion. • "Minimally" could be 1 chapter or 1 chunk of the course, compared to "In-Depth" which would need to be pervasive throughout the course. • "Minimally" could be defined as "worth being familiar with" • "Minimally" could be defined as "important to know and view, they can do something, the basic skill you can know and do" • "Minimally" would be the middle range on the spectrum of how much a concept is being taught. o Something that you would pick up watching a video. o Something worth being familiar with. o Awareness does not seem sufficient o A building block to enduring understanding. A skill base that will stick with them.	

	• Must be addressed in a course outcome and assessable. Questions: • Is “Minimally” the appropriate word? • How will enduring understanding impact the CLO scale (rubric?) • Does awareness of an outcome mean they met the outcome? • Should “minimally” represent how much the student has learned the outcome or how much the instructor has taught it? The discussion was tabled with no vote and will continue through e-mail conversation. Kristen will e-mail the CC with the definitions and let the CC edit it.	
Adjourn: 5:00pm	Linnea motioned, Katy 2nd	
Next Meeting: February 1, 2018 3:30pm – 5:00pm Location: TDC Room 3.218 (SS Conference Room) and HRC Room 1.209 (Conference Room)		

CC date _____
CC decision _____
CC vote _____

Columbia Gorge Community College

General Education/Discipline Studies List Request Form

(Double click on check boxes to activate dialog box)

1. General & Course Information:			
Department	Math	Submitter Name: Phone: Email:	Abel Wolman awolman@cgcc.edu
Course Prefix and Number:	MTH 105	Course Title:	Math in Society
Course Credits:	4	Gen Ed Category:	☐ Arts and Letters ☐ Social Science ☒ Science, Comp. Sci., and Math
Course Description:	Explores applications of mathematics in society including quantitative techniques in personal and public finance, basic probability and statistics for understanding risk and uncertainty, and concepts and applications of formal logic to argumentation and persuasion. Investigates a variety of mathematical problem-solving techniques and provides a sampling of more advanced mathematics or mathematics-related topics. Integrates technology where appropriate. Prerequisites: MTH 95 or MTH 98 or equivalent placement test scores. Prerequisite/concurrent: WR 121. Audit available.		
Course Outcomes:	1. Use relevant mathematical concepts and techniques to critically analyze and make knowledgeable decisions about issues in personal and public finance. 2. Use relevant concepts and techniques from probability and statistics to critically analyze and make knowledgeable decisions about problems involving risk and uncertainty. 3. Construct, interpret, and critique the graphical display of information. 4. Formulate logically rigorous arguments and critique those that are not. 5. Effectively communicate orally and in writing arguments and results based on quantitative and other rigorous forms of mathematical reasoning.		

Lower Division Collegiate (LDC) courses that apply for General Education/Discipline Studies status must:

1. **Be available to all CGCC students who meet the prerequisites for the course.**
2. **Ensure that the appropriate AAOT Discipline Studies outcomes and criteria are reflected in the course's outcomes.** (If you need to revise your course outcomes, you must complete a Course Revision form.)
3. **Verify course transfer status using the Course Transfer/Articulation Status form** (available on the curriculum website)**.** In order to obtain general education status, at least two OUS schools must confirm the course will transfer and one of the schools must approve the transfer as general education.
4. **Have the Standard Prerequisites unless the Department Chair has completed the Prerequisite Opt-Out form and that request is approved.**
5. **Be an LDC course that is eligible for the AAOT Discipline Studies List.**

In addition, course content must address the following:

1. **CGCC's General Education Philosophy Statement:** *Through a broad, well-balanced curriculum, the General Education program strives to instill a lifelong love of learning and to foster civic competence within our students.*
2. **CGCC Core Learning Outcomes (CLO):**
   Through their respective disciplines, CGCC students who earn a degree can:

1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*)
2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*)
3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*)
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*)
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*)

Course outcomes and content are required, at a minimum, to demonstrate that CLOs 1 (*Communication*) and 2 (*Critical Thinking and Problem Solving*) are addressed in depth, and 1 additional CLO is addressed at least minimally.

2. Address CGCC Core Learning Outcomes:	
For each CLO addressed, provide the following: 1) list the course outcome(s) that clearly reflects the CLO; and 2) describe relevant course content, outlining how students will gain the skills and knowledge needed to achieve a level of mastery of the CLO. Please check the appropriate box, "no changes" or "revised," noting whether your response has changed since your last Gen Ed Request submission. Include previous response even if you are not making any revisions.	
Gen Ed designated courses are required to address CLOs 1 and 2 "in-depth."	
1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised Outcome 5: Effectively communicate orally and in writing arguments and results based on quantitative and other rigorous forms of mathematical reasoning. Essentially all of the course content is relevant to and will contribute towards mastery of the CLO. To learn quantitative and other rigorous forms of mathematical reasoning, and apply these reasoning tools to real-world problems, requires patient, persistent, and careful reading and listening skills. These reading and listening skills in turn lead to the development of effective writing and speaking skills tuned to the spare and precise language of mathematics.
2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised Outcome 1: Use relevant mathematical concepts and techniques to critically analyze and make knowledgeable decisions about issues in personal and public finance. Outcome 2: Use relevant concepts and techniques from probability and statistics to critically analyze and make knowledgeable decisions about problems involving risk and uncertainty. Outcome 4: Formulate logically rigorous arguments and critique those that are not. Essentially all of the course content is relevant to and will contribute towards mastery of the CLO. From the development of quantitative reasoning techniques for personal finance, to learning statistical tools for decision making under uncertainty, to acquiring formal methods for assessing arguments, the focus of this course is mathematics in support of critical thinking and problem solving.

Provide a response for each of the following three CLOs that your course addresses. Gen Ed designated courses are required, at a minimum, to address one of these three "minimally" or "in-depth."	
3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*) ☒ in-depth ☐ minimally ☐ not addressed	Outcome 1: Use relevant mathematical concepts and techniques to critically analyze and make knowledgeable decisions about issues in personal and public finance. Outcome 2: Use relevant concepts and techniques from probability and statistics to critically analyze and make knowledgeable decisions about problems involving risk and uncertainty. Outcome 3: Construct, interpret, and critique the graphical display of information. Outcome 4: Formulate logically rigorous arguments and critique those that are not. Outcome 5: Effectively communicate orally and in writing arguments and results based on quantitative and other rigorous forms of mathematical reasoning. The primary goal of and motivation for this course is to improve students' quantitative literacy. Each of the four course outcomes reflects and fulfills this goal.
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*) ☐ in-depth ☐ minimally ☒ not addressed	☒ no changes ☐ revised
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*) ☒ in-depth ☐ minimally ☐ not addressed	☒ no changes ☐ revised Outcome 1: Use relevant mathematical concepts and techniques to critically analyze and make knowledgeable decisions about issues in personal and public finance. Outcome 2: Use relevant concepts and techniques from probability and statistics to critically analyze and make knowledgeable decisions about problems involving risk and uncertainty. Outcome 4: Formulate logically rigorous arguments and critique those that are not. Essentially all of the course content is relevant to and will contribute towards mastery of the CLO. Issues relating to public finance and problems involving risk and uncertainty have profound consequences for individuals, society, and the earth as a whole. No less important to good citizenship is the capacity to distinguish logically rigorous argument from propaganda and canard.

Section # 4 Department Review		
This proposal has been reviewed at the Director level and approved for submission.		
Department Chair	Email	Date
John Evans	jevans@cgcc.edu	1.29.18
Department Director	Email	Date
Mary Kramer	mkramer@cgcc.edu	1.29.18

NEXT STEPS:

1. Save this document as the course prefix and course number.gened (e.g. HST 104.gened). Send completed form electronically to curriculum@cgcc.edu.
2. Complete the Course Signature form found in Forms on the curriculum website. Obtain required electronic or inked signatures and deliver to curriculum office by posted deadline. Refer to the curriculum office website for the Curriculum Committee meeting schedule and submission deadlines. You are encouraged to send submissions prior to the deadline so that the curriculum office may review and provide feedback.
3. Submission will be placed on the next agenda with available time slots. You will be notified of your submission's time for review. It is not mandatory that you attend the Curriculum Committee meeting in which your submission is scheduled for review; however, it is strongly encouraged that you attend so that you may represent your submission and respond to any committee questions. Unanswered questions may result in a submission being rescheduled for further clarification.

Math in Society

Course Number: MTH 105
Transcript Title: Math in Society
Created: December 14, 2015
Updated: June 7, 2017
Total Credits: 4
Lecture Hours: 40
Lecture / Lab Hours: 0
Lab Hours: 0
Satisfies Cultural Literacy requirement: No
Satisfies General Education requirement: Yes
Grading options: A-F (default), P-NP, audit
Repeats available for credit: 0

Prerequisites
MTH 95 (http://www.cgcc.edu/courses/mth-95) or MTH 98 (http://www.cgcc.edu/courses/mth-98) or equivalent placement test scores.

Prerequisite / Concurrent
WR 121 (/courses/wr-121)

Course Description

Explores applications of mathematics in society including quantitative techniques in personal and public finance, basic probability and statistics for understanding risk and uncertainty, and concepts and applications of formal logic to argumentation and persuasion. Investigates a variety of mathematical problem-solving techniques and provides a sampling of more advanced mathematics or mathematics-related topics. Integrates technology where appropriate. Prerequisites: MTH 95 or MTH 98 or equivalent placement test scores. Prerequisite/concurrent: WR 121. Audit available.

Intended Outcomes

Upon successful completion of this course, students will be able to:

1. Use relevant mathematical concepts and techniques to critically analyze and make knowledgeable decisions about issues in personal and public finance.
2. Use relevant concepts and techniques from probability and statistics to critically analyze and make knowledgeable decisions about problems involving risk and uncertainty.
3. Construct, interpret, and critique the graphical display of information.
4. Formulate logically rigorous arguments and critique those that are not.
5. Effectively communicate orally and in writing arguments and results based on quantitative and other rigorous forms of mathematical reasoning.

Alignment with Institutional Core Learning Outcomes

In-depth	1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. *(Communication)*
In-depth	2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. *(Critical thinking and Problem-Solving)*
	3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. *(Quantitative Literacy)*
Not Addressed	4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. *(Cultural Awareness)*
In-depth	5. Recognize the consequences of human activity upon our social and natural world. *(Community and Environmental Responsibility)*

Outcome Assessment Strategies

Assessment shall include some combination of the following:

- Class participation
- Group projects
- Presentations
- Portfolios
- Research papers
- Homework assignments
- Written paper
- Quizzes
- Exams
- Other assessments of the instructor's choosing

Course Activities and Design

Course delivery is through a combination of lecture and student activities including group and individual problem solving during class. Emphasis is to be given to applications from outside the mathematics classroom. Applications will come from the broadest possible range of disciplines.

Course Content (Themes, Concepts, Issues and Skills)

1. **Financial literacy**

- Taxes (percent sales, income, value added, other)
- Simple and compound interest
- Annuities
- Loans and credit

2. **Logical reasoning and problem solving**

- Describing and critiquing arguments
- Understanding the language of logic
- Recognizing common logical fallacies
- Non-algebraic problem-solving strategies

3. **Probability and statistics**

- Counting rules
- Measures of central tendency and spread
- Calculating and interpreting basic probabilities
- Constructing and interpreting graphical displays of information
- Margins of error and polling
- Expectation
- Probability distributions
- Risk and uncertainty
- Misuse of data and statistics

4. **Additional math and math-related topics**

- Applied trigonometry
- Apportionment
- Boolean algebra
- Category theory
- Chaos theory
- Classical and quantum computing
- Complexity theory
- Cryptography
- Data science
- Dimensional analysis
- Discrete mathematics
- Economics
- Fair division
- Fractal geometry

- Game theory
- Graph theory and networks
- Group theory and symmetry
- History of mathematics
- Machine learning
- Math and ecology (biodiversity, climate change)
- Math and the arts
- Math and the law
- Measurement theory
- Modeling growth and decay
- Non-Euclidean geometry
- Number theory
- Numerical analysis
- Optimization
- Probability (frequentist, Bayesian, randomization)
- Scheduling and linear programming
- Set theory and transfinite arithmetic
- Topology (general, algebraic)
- Voting theory

Department Notes

Word problems are to be answered using complete sentences and include appropriate units.

CC date _____
CC decision _____
CC vote _____

Columbia Gorge Community College

General Education/Discipline Studies List Request Form

(Double click on check boxes to activate dialog box)

1. General & Course Information:			
Department	Math	Submitter Name: Phone: Email:	John Evans 541 – 506 - 6172
Course Prefix and Number:	MTH 111	Course Title:	College Algebra
Course Credits:	5	Gen Ed Category:	☐ Arts and Letters ☐ Social Science ☒ Science, Comp. Sci., and Math
Course Description:	Explores relations and functions graphically, numerically, symbolically, and verbally. Examines exponential, logarithmic, power, polynomial, and rational functions. Investigates applications from a variety of perspectives. Prerequisites: WR 115, RD 115 and MTH 95 or equivalent placement test scores. Audit available.		
Course Outcomes:	Upon successful completion students will be able to: 1. Model non-trivial, real world phenomena using multiple mathematical approaches and to interpret results. 2. Demonstrate mastery of exponential, logarithmic, polynomial, power, and rational functions. 3. Accurately compute results using the technology, algebra, and functions. 4. Communicate results mathematically and in writing.		

Lower Division Collegiate (LDC) courses that apply for General Education/Discipline Studies status must:

1. **Be available to all CGCC students who meet the prerequisites for the course.**
2. **Ensure that the appropriate AAOT Discipline Studies outcomes and criteria are reflected in the course's outcomes.** (If you need to revise your course outcomes, you must complete a Course Revision form.)
3. **Verify course transfer status using the Course Transfer/Articulation Status form** (available on the curriculum website)**.** In order to obtain general education status, at least two OUS schools must confirm the course will transfer and one of the schools must approve the transfer as general education.
4. **Have the Standard Prerequisites unless the Department Chair has completed the Prerequisite Opt-Out form and that request is approved.**
5. **Be an LDC course that is eligible for the AAOT Discipline Studies List.**

In addition, course content must address the following:

1. **CGCC's General Education Philosophy Statement:** *Through a broad, well-balanced curriculum, the General Education program strives to instill a lifelong love of learning and to foster civic competence within our students.*
2. **CGCC Core Learning Outcomes (CLO):**
   Through their respective disciplines, CGCC students who earn a degree can:
   1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*)
   2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*)
   3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*)

4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*)
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*)

Course outcomes and content are required, at a minimum, to demonstrate that CLOs 1 (*Communication*) and 2 (*Critical Thinking and Problem Solving*) are addressed in depth, and 1 additional CLO is addressed at least minimally.

2. Address CGCC Core Learning Outcomes:	
For each CLO addressed, provide the following: 1) list the course outcome(s) that clearly reflects the CLO; and 2) describe relevant course content, outlining how students will gain the skills and knowledge needed to achieve a level of mastery of the CLO. Please check the appropriate box, "no changes" or "revised," noting whether your response has changed since your last Gen Ed Request submission. Include previous response even if you are not making any revisions.	
Gen Ed designated courses are required to address CLOs 1 and 2 "in-depth."	
1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised 1. Model non-trivial, real world phenomena using multiple mathematical approaches and to interpret results. 4. Communicate results mathematically and in writing. All of the content in this class leads to mastery of this CLO. Students in math are taught (from math 60 onward) that it is not enough to merely solve the problem. Those with math training normally need to communicate the results clearly to others less versed in mathematics.
2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised 1. Model non-trivial, real world phenomena using multiple mathematical approaches and to interpret results. 2. Demonstrate mastery of exponential, logarithmic, polynomial, power, and rational functions. 3. Accurately compute results using the technology, algebra, and functions. 4. Communicate results mathematically and in writing. This is the part of the core of the class. Students are taught general concepts and called upon to tie together all of their knowledge of mathematics to exam real life problems that can be modeled with the types of functions listed in the outcomes. More specific examples include modeling population growth or the depletion of natural resources with exponential functions or comparing different payment plans using linear functions.
Provide a response for each of the following three CLOs that your course addresses. Gen Ed designated courses are required, at a minimum, to address one of these three "minimally" or "in-depth."	

3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*) ☒ in-depth ☐ minimally ☐ not addressed	1. Model non-trivial, real world phenomena using multiple mathematical approaches and to interpret results. 2. Demonstrate mastery of exponential, logarithmic, polynomial, power, and rational functions. 3. Accurately compute results using the technology, algebra, and functions. 4.Communicate results mathematically and in writing. This, along with problem-solving is the core of the course. This is one of the main purposes of mathematics. Students learn theory, concepts, and techniques for doing exactly this. In math 111 the vehicle is all the algebra they learned in previous courses. Examples include modeling population growth and the cost of cleaning a disaster.
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*) ☐ in-depth ☐ minimally ☒ not addressed	☒ no changes ☐ revised
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*) ☐ in-depth ☒ minimally ☐ not addressed	☒ no changes ☐ revised 1. Model non-trivial, real world phenomena using multiple mathematical approaches and to interpret results. While this is not covered heavily, it is not possible to study exponential functions without recognizing the consequences of human activity on our social and natural world. When studying such functions typical examples include population models, carbon dating, and depletion of natural resources. We also study doubling time. For example the world's population is currently doubling every 40 to 50 years; current reserves of copper ore will be gone in the middle of the next decade.

Section # 4 Department Review		
This proposal has been reviewed at the Director level and approved for submission.		
Department Chair	Email	Date
John Evans	jevans@cgcc.edu	01/25/18
Department Director	Email	Date
Mary Kramer	mkramer@cgcc.edu	1.29.18

NEXT STEPS:

1. Save this document as the course prefix and course number.gened (e.g. HST 104.gened). Send completed form electronically to curriculum@cgcc.edu.
2. Complete the Course Signature form found in Forms on the curriculum website. Obtain required electronic or inked signatures and deliver to curriculum office by posted deadline. Refer to the curriculum office website for the

College Algebra

Course Number: MTH 111
Transcript Title: College Algebra
Created: September 1, 2012
Updated: June 7, 2017
Total Credits: 5
Lecture Hours: 50
Lecture / Lab Hours: 0
Lab Hours: 0
Satisfies Cultural Literacy requirement: No
Satisfies General Education requirement: Yes
Grading options: A-F (default), P-NP, audit
Repeats available for credit: 0

Prerequisites
MTH 95 (http://cgcc.us/courses/mth-95) or equivalent placement test scores

Prerequisite / Concurrent
WR 121 (/courses/wr-121)

Course Description

Explores relations and functions graphically, numerically, symbolically, and verbally. Examines exponential, logarithmic, power, polynomial, and rational functions. Investigates applications from a variety of perspectives. Prerequisite: MTH 95 or equivalent placement test scores. Prerequisite/concurrent: WR 121. Audit available.

Intended Outcomes

Upon successful completion students should be able to:

1. Model non-trivial, real world phenomena using multiple mathematical approaches and to interpret results.
2. Demonstrate mastery of exponential, logarithmic, polynomial, power, and rational functions.
3. Accurately compute results using the technology, algebra, and functions.
4. Communicate results mathematically and in writing.

Alignment with Institutional Core Learning Outcomes

In-depth	1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. *(Communication)*
In-depth	2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. *(Critical thinking and Problem-Solving)*
	3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. *(Quantitative Literacy)*
Not Addressed	4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. *(Cultural Awareness)*
Minimally	5. Recognize the consequences of human activity upon our social and natural world. *(Community and Environmental Responsibility)*

Outcome Assessment Strategies

At least one project plus some combination of the following:

- Class participation

- Group projects
- Presentations
- Portfolios
- Research papers
- Homework assignments
- Written paper
- Quizzes
- Exams
- Other assessments of the instructors choosing

Course Activities and Design

This course will be delivered through a combination of lecture and student activities including group and individual problem solving during class. Emphasis is to be given to applications from outside the mathematics classroom. Applications will come from the broadest possible range of disciplines.

Course Content (Themes, Concepts, Issues and Skills)

1. Functions
   - Function Notation
   - Domain and Range
   - Composition of Functions
   - Transformation of Functions
   - Inverse Functions
2. Exponential functions and equations
   - Graphs
   - Solving equations involving exponentials
   - Applications
3. Logarithmic functions and equations
   - Graphs
   - Properties
   - Solving equations involving logarithms
   - Modeling
4. Polynomial functions
   - Power Functions
   - Linear Functions
   - Quadratic Functions
   - Graphs
   - Features of polynomial functions
5. Rational functions
   - Graphs
   - Features of rational functions
6. Technology
   - Use of Scientific/Graphing calculators and/or other appropriate mathematical technology.

Department Notes

Word problems are to be answered using complete sentences and include appropriate units.

CC date _____
CC decision _____
CC vote _____

Columbia Gorge Community College

General Education/Discipline Studies List Request Form

(Double click on check boxes to activate dialog box)

1. General & Course Information:			
Department	Math	Submitter Name: Phone: Email:	John Evans 541 – 506 – 6172 jevans@cgcc.edu
Course Prefix and Number:	MTH 112	Course Title:	Elementary Functions
Course Credits:	5	Gen Ed Category:	☐ Arts and Letters ☐ Social Science ☒ Science, Comp. Sci., and Math
Course Description:	Investigates periodic functions, trigonometric identities, vectors, polar coordinates, parametric equations, complex numbers and applications. Graphing calculator required. Prerequisite: MTH 111 or equivalent placement test scores. Audit available.		
Course Outcomes:	Upon successful completion of this course, students will be able to: 1. Recognize periodic phenomena in which trigonometric functions can aid in overall understanding. 2. Construct appropriate models using periodic functions. 3. Recognize applications in which vectors, polar coordinates, parametric equations or complex numbers can aid in overall understanding. 4. Accurately compute results through the appropriate use of technology and algebra. 5. Analyze and effectively communicate results within a mathematical context.		

Lower Division Collegiate (LDC) courses that apply for General Education/Discipline Studies status must:

1. **Be available to all CGCC students who meet the prerequisites for the course.**
2. **Ensure that the appropriate AAOT Discipline Studies outcomes and criteria are reflected in the course's outcomes.** (If you need to revise your course outcomes, you must complete a Course Revision form.)
3. **Verify course transfer status using the Course Transfer/Articulation Status form** (available on the curriculum website)**.** In order to obtain general education status, at least two OUS schools must confirm the course will transfer and one of the schools must approve the transfer as general education.
4. **Have the Standard Prerequisites unless the Department Chair has completed the Prerequisite Opt-Out form and that request is approved.**
5. **Be an LDC course that is eligible for the AAOT Discipline Studies List.**

In addition, course content must address the following:

1. **CGCC's General Education Philosophy Statement:** *Through a broad, well-balanced curriculum, the General Education program strives to instill a lifelong love of learning and to foster civic competence within our students.*
2. **CGCC Core Learning Outcomes (CLO):**
   Through their respective disciplines, CGCC students who earn a degree can:
   1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*)
   2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*)

3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*)
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*)
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*)

Course outcomes and content are required, at a minimum, to demonstrate that CLOs 1 (*Communication*) and 2 (*Critical Thinking and Problem Solving*) are addressed in depth, and 1 additional CLO is addressed at least minimally.

2. Address CGCC Core Learning Outcomes:	
For each CLO addressed, provide the following: 1) list the course outcome(s) that clearly reflects the CLO; and 2) describe relevant course content, outlining how students will gain the skills and knowledge needed to achieve a level of mastery of the CLO. Please check the appropriate box, "no changes" or "revised," noting whether your response has changed since your last Gen Ed Request submission. Include previous response even if you are not making any revisions.	
Gen Ed designated courses are required to address CLOs 1 and 2 "in-depth."	
1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised 5. Analyze and effectively communicate results within a mathematical context. All math classes beginning with math 60 cover this outcome; this is merely continued and strengthened through math 112. It is not acceptable to analyze and problem solve in a vacuum; that is built into all math courses through the content and assessment.
2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised 1. Recognize periodic phenomena in which trigonometric functions can aid in overall understanding. 2. Construct appropriate models using periodic functions. 3. Recognize applications in which vectors, polar coordinates, parametric equations or complex numbers can aid in overall understanding. 4. Accurately compute results through the appropriate use of technology and algebra. 5. Analyze and effectively communicate results within a mathematical context. The course outcomes speak to this almost directly. These outcomes speak directly to this CLO. In this class students learn to analyze and model period behavior. That is, behavior that repeats itself over time. Doing this properly requires research, reasoning, and evaluation of information.
Provide a response for each of the following three CLOs that your course addresses. **Gen Ed designated courses are required, at a minimum, to address one of these three "minimally" or "in-depth."**	

3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*) ☒ in-depth ☐ minimally ☐ not addressed	1. Recognize periodic phenomena in which trigonometric functions can aid in overall understanding. 2. Construct appropriate models using periodic functions. 3. Recognize applications in which vectors, polar coordinates, parametric equations or complex numbers can aid in overall understanding. 4. Accurately compute results through the appropriate use of technology and algebra. 5. Analyze and effectively communicate results within a mathematical context. The course outcomes speak to this almost directly. The methods described in this outcomes are quantitative in nature. A typical example involves looking at data on the length of daylight each day for a year and using this to formulate a function describing this. With the function students can then make calculations. We would also look at the graph to see how well it matches the data. This is the core of mathematics.
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*) ☐ in-depth ☐ minimally ☒ not addressed	☐ no changes ☐ revised
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*) ☐ in-depth ☒ minimally ☐ not addressed	☒ no changes ☐ revised 1. Recognize periodic phenomena in which trigonometric functions can aid in overall understanding. 2. Construct appropriate models using periodic functions. 3. Recognize applications in which vectors, polar coordinates, parametric equations or complex numbers can aid in overall understanding. 4. Accurately compute results through the appropriate use of technology and algebra. 5. Analyze and effectively communicate results within a mathematical context. While this is not a major focus of the course, students cannot study man made phenomena (motors and other mechanical devices that behave periodically) without also learning of their impact upon our natural world.

Section # 4 Department Review		
This proposal has been reviewed at the Director level and approved for submission.		
Department Chair	Email	Date
John Evans	jevans@cgcc.edu	01/26/18
Department Director	Email	Date
Mary Kramer	mkramer@cgcc.edu	1.29.18

NEXT STEPS:

Elementary Functions

Course Number: MTH 112
Transcript Title: Elementary Functions
Created: September 1, 2012
Updated: June 7, 2017
Total Credits: 5
Lecture Hours: 50
Lecture / Lab Hours: 0
Lab Hours: 0
Satisfies Cultural Literacy requirement: No
Satisfies General Education requirement: Yes
Grading options: A-F (default), P-NP, audit
Repeats available for credit: 0

Prerequisites
MTH 111 (http://cgcc.us/courses/mth-111) or equivalent placement test scores

Prerequisite / Concurrent
WR 121 (/courses/wr-121)

Course Description

Investigates periodic functions, trigonometric identities, vectors, polar coordinates, parametric equations, complex numbers and applications. Graphing calculator required. Prerequisite: MTH 111 or equivalent placement test scores. Prerequisite/concurrent: WR 121. Audit available.

Intended Outcomes

Upon successful completion of this course, students will be able to:

1. Recognize periodic phenomena in which trigonometric functions can aid in overall understanding.
2. Construct appropriate models using periodic functions.
3. Recognize applications in which vectors, polar coordinates, parametric equations or complex numbers can aid in overall understanding.
4. Accurately compute results through the appropriate use of technology and algebra.
5. Analyze and effectively communicate results within a mathematical context.

Alignment with Institutional Core Learning Outcomes

In-depth	1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. *(Communication)*
In-depth	2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. *(Critical thinking and Problem-Solving)*
	3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. *(Quantitative Literacy)*
Not Addressed	4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. *(Cultural Awareness)*
In-depth	5. Recognize the consequences of human activity upon our social and natural world. *(Community and Environmental Responsibility)*

Outcome Assessment Strategies

At least one project plus some combination of the following:

- Class participation

- Group projects
- Presentations
- Portfolios
- Research papers
- Homework assignments
- Written paper
- Quizzes
- Exams
- Other assessments of the instructors choosing

Course Activities and Design

This course will be delivered through a combination of lecture and student activities including group and individual problem solving during class. Emphasis is to be given to applications from outside the mathematics classroom. Applications will come from the broadest possible range of disciplines.

Course Content (Themes, Concepts, Issues and Skills)

1. Unit Circle Trigonometry
   a. Unit Circles
   b. Angles
   c. Circles, Triangles, Sine and Cosine
   d. The Other Trigonometric Functions
   e. Reference Angles.
2. Periodic Functions
   a. Sinusoidal Graphs
   b. Graphs of the Other Trig Functions
   c. Inverse Trig functions
   d. Trig Identities
   e. Modeling.
3. Further Applications
   a. Non-right triangles: Law of Sines and Cosines
   b. Polar Coordinates and Complex Numbers
   c. Parametric Equations
   d. Vectors and their Applications

Department Notes

Answers to all application problems will be given in complete sentences with correct units. The grade will include at least one project.

CC date _____
CC decision _____
CC vote _____

Columbia Gorge Community College

General Education/Discipline Studies List Request Form

(Double click on check boxes to activate dialog box)

1. General & Course Information:			
Department	Math	Submitter Name: Phone: Email:	Abel Wolman awolman@cgcc.edu
Course Prefix and Number:	MTH 243	Course Title:	Statistics I
Course Credits:	5	Gen Ed Category:	☐ Arts and Letters ☐ Social Science ☒ Science, Comp. Sci., and Math
Course Description:	Introduces displaying data with graphs, numerical descriptions of data, producing data, elementary probability, probability distributions, confidence intervals and significance testing. Investigates applications from science, business, and social science perspectives. Graphing calculator required. Prerequisite: MTH 95. Prerequisite/concurrent: WR 121. Audit available.		
Course Outcomes:	1. Identify concepts and techniques from descriptive and inferential statistics and real-world applications of the same. 2. Use concepts and techniques from descriptive and inferential statistics to describe, model, and analyze real-world problems. 3. Critique the application of probability and statistics to real-world problems and effectively communicate these ideas in written and verbal form.		

Lower Division Collegiate (LDC) courses that apply for General Education/Discipline Studies status must:

1. **Be available to all CGCC students who meet the prerequisites for the course.**
2. **Ensure that the appropriate AAOT Discipline Studies outcomes and criteria are reflected in the course's outcomes.** (If you need to revise your course outcomes, you must complete a Course Revision form.)
3. **Verify course transfer status using the Course Transfer/Articulation Status form** (available on the curriculum website)**.** In order to obtain general education status, at least two OUS schools must confirm the course will transfer and one of the schools must approve the transfer as general education.
4. **Have the Standard Prerequisites unless the Department Chair has completed the Prerequisite Opt-Out form and that request is approved.**
5. **Be an LDC course that is eligible for the AAOT Discipline Studies List.**

In addition, course content must address the following:

1. **CGCC's General Education Philosophy Statement:** *Through a broad, well-balanced curriculum, the General Education program strives to instill a lifelong love of learning and to foster civic competence within our students.*
2. **CGCC Core Learning Outcomes (CLO):**
   Through their respective disciplines, CGCC students who earn a degree can:
   1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*)
   2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*)
   3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*)

4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*)
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*)

Course outcomes and content are required, at a minimum, to demonstrate that CLOs 1 (*Communication*) and 2 (*Critical Thinking and Problem Solving*) are addressed in depth, and 1 additional CLO is addressed at least minimally.

2. Address CGCC Core Learning Outcomes:	
For each CLO addressed, provide the following: 1) list the course outcome(s) that clearly reflects the CLO; and 2) describe relevant course content, outlining how students will gain the skills and knowledge needed to achieve a level of mastery of the CLO. Please check the appropriate box, "no changes" or "revised," noting whether your response has changed since your last Gen Ed Request submission. Include previous response even if you are not making any revisions.	
Gen Ed designated courses are required to address CLOs 1 and 2 "in-depth."	
1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised Outcome 3: Critique the application of probability and statistics to real-world problems and effectively communicate these ideas in written and verbal form. Virtually all of the course content is relevant to and will contribute towards mastery of the CLO. Statistics is a challenging subject. Its core themes, variation, regularity within disorder, and inference, are new territory for most students. Grappling with the many unfamiliar concepts, terms, and techniques developed to address statistical problems sharpens student reading, listening, and observational skills. Learning the statistical vernacular refines student writing and speaking skills.
2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised Outcome 2: Use concepts and techniques from descriptive and inferential statistics to describe, model, and analyze real-world problems. Virtually all of the course content is relevant to and will contribute towards mastery of the CLO. Statistical thinking is distinctive, demanding, and fruitful. Statistics moves from the particular to the general; it aims to capture and summarize what is regular in what is varying and irregular. Statistical thinking therefore offers new methods for problem solving and new strategies for critical thinking.
Provide a response for each of the following three CLOs that your course addresses. Gen Ed designated courses are required, at a minimum, to address one of these three "minimally" or "in-depth."	

3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*) ☒ in-depth ☐ minimally ☐ not addressed	Outcome 1: Identify concepts and techniques from descriptive and inferential statistics and real-world applications of the same. Outcome 2: Use concepts and techniques from descriptive and inferential statistics to describe, model, and analyze real-world problems. Outcome 3: Critique the application of probability and statistics to real-world problems and effectively communicate these ideas in written and verbal form. The study of statistics improves students' ability to extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. Each of the three course outcomes for this course is directed towards student statistical and hence quantitative literacy.
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*) ☐ in-depth ☐ minimally ☒ not addressed	☒ no changes ☐ revised
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*) ☒ in-depth ☐ minimally ☐ not addressed	☒ no changes ☐ revised Outcome 3: Critique the application of probability and statistics to real-world problems and effectively communicate these ideas in written and verbal form. Statistical thinking, uncovering the regular in the irregular, inferring the general from the particular, is often the only means for discovering the noise-obscured consequences of human action on the social and natural world (and the noisy action of the social and natural world on humans).

Section # 4 Department Review		
This proposal has been reviewed at the Director level and approved for submission.		
Department Chair	Email	Date
John Evans	jevans@cgcc.edu	1.29.18
Department Director	Email	Date
Mary Kramer	mkramer@cgcc.edu	1.29.28

NEXT STEPS:

1. Save this document as the course prefix and course number.gened (e.g. HST 104.gened). Send completed form electronically to curriculum@cgcc.edu.
2. Complete the Course Signature form found in Forms on the curriculum website. Obtain required electronic or inked signatures and deliver to curriculum office by posted deadline. Refer to the curriculum office website for the Curriculum Committee meeting schedule and submission deadlines. You are encouraged to send submissions prior to the deadline so that the curriculum office may review and provide feedback.

Statistics I

Course Number: MTH 243
Transcript Title: Statistics I
Created: September 1, 2012
Updated: June 7, 2017
Total Credits: 5
Lecture Hours: 50
Lecture / Lab Hours: 0
Lab Hours: 0
Satisfies Cultural Literacy requirement: No
Satisfies General Education requirement: Yes
Grading options: A-F (default), P-NP, audit
Repeats available for credit: 0

Prerequisites
MTH 95 (/courses/mth-95)

Prerequisite / Concurrent
WR 121 (/courses/wr-121)

Course Description

Introduces displaying data with graphs, numerical descriptions of data, producing data, elementary probability, probability distributions, confidence intervals and significance testing. Investigates applications from science, business, and social science perspectives. Graphing calculator required. Prerequisite: MTH 95. Prerequisite/concurrent: WR 121. Audit available.

Intended Outcomes

Upon successful completion of this course, students will be able to:

1. Identify concepts and techniques from descriptive and inferential statistics and real-world applications of the same.
2. Use concepts and techniques from descriptive and inferential statistics to describe, model, and analyze real-world problems.
3. Critique the application of probability and statistics to real-world problems and effectively communicate these ideas in written and verbal form.

Alignment with Institutional Core Learning Outcomes

In-depth	1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. *(Communication)*
In-depth	2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. *(Critical thinking and Problem-Solving)*
	3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. *(Quantitative Literacy)*
Not Addressed	4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. *(Cultural Awareness)*
Minimally	5. Recognize the consequences of human activity upon our social and natural world. *(Community and Environmental Responsibility)*

Outcome Assessment Strategies

Assessment shall include some combination of the following:

- Class participation
- Group projects

- Presentations
- Portfolios
- Research papers
- Homework assignments
- Written paper
- Quizzes
- Exams
- Other assessments of the instructors choosing

Course Activities and Design

Concepts will be introduced using lecture, group activities, calculator and/or computer programs, and computer laboratory explorations. Students will communicate their results orally and in writing.

Course Content (Themes, Concepts, Issues and Skills)

1.0 Introduction

The instructional goal is to explore how an understanding of statistics is beneficial to jobs in business, industry, government, medicine, and other fields.

1.1 Describe and discuss descriptive and inferential statistics.
1.2 Identify and describe common statistical terminology:

1.2.1 Population
1.2.2 Sample
1.2.3 Variable
1.2.4 Statistical inference

2.0 Describing Sets of Data

The instructional goal is to explore, analyze, and describe a set of data using graphical and numerical methods.

2.1 Identify qualitative and quantitative data.
2.2 Construct pie charts and bar charts.
2.3 Construct frequency and relative frequency distributions.
2.4 Construct frequency and relative frequency histograms.
2.5 Construct a stem-and-leaf display.
2.6 Construct a dotplot.
2.7 Describe the shape of a distribution as symmetric, skewed left, or skewed right.
2.8 Calculate and interpret the numerical measures of central tendency:

2.8.1 Mean
2.8.2 Median
2.8.3 Mode

2.9 Calculate and interpret the numerical measures of dispersion:

2.9.1 Range
2.9.2 Variance
2.9.3 Standard deviation

2.10 Interpret the meaning of the standard deviation using the Empirical Rule and/or Chebyshev's Rule.
2.11 Calculate and interpret measures of relative standing:

2.11.1 Percentile ranking
2.11.2 Z-scores

2.12 Construct a modified boxplot.
2.13 Look for relationships between two variables:

2.13.1 Identify response and explanatory variables.
2.13.2 Construct a scatterplot.
2.13.3 Determine whether the two variables have a positive or negative association.
2.13.4 Calculate and interpret the correlation coefficient, r, and the coefficient of determination, r2.
2.13.5 Calculate and interpret the least-squares regression line.
2.13.6 Predict values of the dependent variable using the least-squares regression line.
2.13.7 Discuss cautions about regression and correlation including:

2.13.7.1 Residuals
2.13.7.2 Lurking variables

2.13.7.3 Causation

2.14 Using technology

2.14.1 Input and edit data
2.14.2 Draw dotplots, histograms, boxplots, scatterplots, and residual plots.
2.14.3 Calculate one-variable summary statistics.

3.0 Producing Data

The instructional goal is to explore the design of statistical samples and experiments.

3.1 Identify the elements of experiments and observational studies including:

3.1.1 Experimental units
3.1.2 Factors
3.1.3 Placebo
3.1.4 Bias
3.1.5 Randomization

3.2 Identify the differences between experiments and observational studies.
3.3 Identify sample designs including:

3.3.1 Voluntary response sample
3.3.2 Simple random sample
3.3.3 Stratified sample
3.3.4 Multistage sample
3.3.5 Systematic sample
3.3.6 Cluster sample

3.4 Using technology or a table of random numbers select a simple random sample.

4.0 Elementary Probability

The instructional goal is to explore the concepts of probability.

4.1 Identify and describe standard probability terms:

4.1.1 Experiment
4.1.2 Simple event
4.1.3 Sample space
4.1.4 Disjoint events
4.1.5 Independent events
4.1.6 Complementary events

4.2 Calculate and interpret marginal, joint, and conditional probabilities.
4.3 Calculate and interpret probabilities using:

4.3.1 Venn diagrams
4.3.2 Contingency tables
4.3.3 Tree diagrams
4.3.4 Additive rule
4.3.5 Multiplicative rule

4.4 Calculate and interpret probabilities using Bayes' Theorem.

5.0 Random Variables and Probability Distributions

The instructional goal is to explore and analyze various random variables and probability distributions.

5.1 Identify and describe terminology:

5.1.1 Random variable
5.1.2 Probability distribution
5.1.3 Expected value
5.1.4 Variance and standard deviation
5.1.5 Probability density function

5.2 Identify a random variable as discrete or continuous.
5.3 Explore the binomial discrete probability distribution.
5.4 Explore the normal continuous probability distribution.
5.5 Approximate a binomial probability using a normal distribution.
5.6 Using technology, input a probability density function and its appropriate parameters.

5.6.1 Compute and interpret the probability that a discrete random variable is equal to a specified value.
5.6.2 Compute and interpret the probability that a discrete random variable lies within an interval of values.
5.6.3 Compute and interpret the probability that a continuous random variable lies within an interval of values.

5.7 Using technology, simulate probability distributions by generating random data.

5.7.1 Binomial
5.7.2 Normal

5.8 Compute and interpret the mean and standard deviation of:

5.8.1 A discrete random variable
5.8.2 A linear transformation of a random variable
5.8.3 The sum or difference of two independent random variables

6.0 Sampling Distributions

The instructional goal is to explore and analyze sampling distributions.

6.1 Identify and describe terminology:

6.1.1 Parameter
6.1.2 Statistic
6.1.3 Point estimator
6.1.4 Biased vs. unbiased

6.2 Calculate and interpret a sample mean and its standard deviation.
6.3 Explore the distribution of the means of samples drawn from a population.
6.4 Identify the properties of sampling distributions.
6.5 Explore the Central Limit Theorem.
6.6 Solve probability problems involving the standardized sample mean.

7.0 Estimation

The instructional goal is to estimate a population parameter by calculating a confidence interval.

7.1 Identify and describe terminology:

7.1.1 Point estimator
7.1.2 Confidence level
7.1.3 Confidence interval

7.2 Calculate and interpret a large-sample estimation of a population mean or proportion.
7.3 Calculate a sample size to attain a desired margin of error and confidence level.

8.0 Significance Testing

The instructional goal is to understand the logic, formal structure, appropriate use, and proper interpretation of significance testing.

8.1 Identify and describe terminology:

8.1.1 Null hypothesis (as an equation)
8.1.2 Alternative hypothesis (one-sided vs two-sided)
8.1.3 Significance level (alpha-value)
8.1.4 P-value
8.1.5 Statistical significance

8.2 Performance and interpretation:

8.2.1 Specify an appropriate parameter of interest
8.2.2 Identify/produce data, and properly set up a basic significance test
8.2.3 Be able to compute a P-value:

(a) Using a single (context-specific) significance test software function and/or
(b) Using a calculated test statistic and a software Cdf function, and/or
(c) Using a normal distribution table.

8.2.4 Assess results for statistical significance against a predetermined significance level.
8.2.5 Distinguish between statistical vs. practical significance.

8.3 Compare the information a confidence interval provides versus a significance test.
8.4 Verify required conditions for the test of significance.

Department Notes

This is the first term of a two-term sequence (MTH 243 and 244). This course is intended to provide an introduction to statistics in a data-based setting.

CC date _____
CC decision _____
CC vote _____

Columbia Gorge Community College

General Education/Discipline Studies List Request Form

(Double click on check boxes to activate dialog box)

1. General & Course Information:			
Department	Math	Submitter Name: Phone: Email:	Abel Wolman awolman@cgcc.edu
Course Prefix and Number:	MTH 244	Course Title:	Statistics II
Course Credits:	5	Gen Ed Category:	☐ Arts and Letters ☐ Social Science ☒ Science, Comp. Sci., and Math
Course Description:	Investigates confidence interval estimation; tests of significance including z-tests, t-tests, ANOVA, and chi-square; and inference for linear regression. Applications are investigated from science, business, and social science perspectives. Graphing calculator with advanced statistical programs required and/or computer software. Prerequisites: MTH 243 and its prerequisite requirements. Audit available.		
Course Outcomes:	1. Statistically analyze observational and experimental studies and critically assess results from the same. 2. Clearly communicate statistical procedures and results. 3. Read with understanding scholarly publications and critically assess public dissemination of statistical information. 4. Adapt statistical techniques and reasoning to other disciplines and vocations.		

Lower Division Collegiate (LDC) courses that apply for General Education/Discipline Studies status must:

1. **Be available to all CGCC students who meet the prerequisites for the course.**
2. **Ensure that the appropriate AAOT Discipline Studies outcomes and criteria are reflected in the course's outcomes.** (If you need to revise your course outcomes, you must complete a Course Revision form.)
3. **Verify course transfer status using the Course Transfer/Articulation Status form** (available on the curriculum website)**.** In order to obtain general education status, at least two OUS schools must confirm the course will transfer and one of the schools must approve the transfer as general education.
4. **Have the Standard Prerequisites unless the Department Chair has completed the Prerequisite Opt-Out form and that request is approved.**
5. **Be an LDC course that is eligible for the AAOT Discipline Studies List.**

In addition, course content must address the following:

1. **CGCC's General Education Philosophy Statement:** *Through a broad, well-balanced curriculum, the General Education program strives to instill a lifelong love of learning and to foster civic competence within our students.*
2. **CGCC Core Learning Outcomes (CLO):**
   Through their respective disciplines, CGCC students who earn a degree can:
   1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*)
   2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*)
   3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*)

4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*)
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*)

Course outcomes and content are required, at a minimum, to demonstrate that CLOs 1 (*Communication*) and 2 (*Critical Thinking and Problem Solving*) are addressed in depth, and 1 additional CLO is addressed at least minimally.

2. Address CGCC Core Learning Outcomes:	
For each CLO addressed, provide the following: 1) list the course outcome(s) that clearly reflects the CLO; and 2) describe relevant course content, outlining how students will gain the skills and knowledge needed to achieve a level of mastery of the CLO. Please check the appropriate box, "no changes" or "revised," noting whether your response has changed since your last Gen Ed Request submission. Include previous response even if you are not making any revisions.	
Gen Ed designated courses are required to address CLOs 1 and 2 "in-depth."	
1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised Outcome 2: Clearly communicate statistical procedures and results. Virtually all of the course content is relevant to and will contribute towards mastery of the CLO. Statistics is a challenging subject. Its core themes, variation, regularity within disorder, and inference, are new territory for most students. This is particularly true in this second quarter of statistics with its emphasis on often counterintuitive inferential procedures including significance testing and interval estimation. Working with these unfamiliar concepts, terms, and techniques for solving statistical problems sharpens student reading, listening, and observational skills. Learning to express the distinctive statistical point of view and its idiosyncratic methods hones student writing and speaking skills.
2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised Outcome 4: Adapt statistical techniques and reasoning to other disciplines and vocations. Virtually all of the course content is relevant to and will contribute towards mastery of the CLO. Statistical approaches to problem solving, particularly those concerned with statistical inference and estimation, are at once mysterious, demanding, and powerful. Statistics moves from the particular to the general; it aims to capture and summarize what is regular in what is varying and irregular. In this way, statistics provides novel problem-solving strategies and an alternative framework for critical thinking.
Provide a response for each of the following three CLOs that your course addresses. **Gen Ed designated courses are required, at a minimum, to address one of these three "minimally" or "in-depth."**	

3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*) ☒ in-depth ☐ minimally ☐ not addressed	Outcome 1: Statistically analyze observational and experimental studies and critically assess results from the same. Outcome2: Clearly communicate statistical procedures and results. Outcome3: Read with understanding scholarly publications and critically assess public dissemination of statistical information. Outcome 4: Adapt statistical techniques and reasoning to other disciplines and vocations. The study of statistics improves students' ability to extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. Each of the four course outcomes for this course is directed towards student statistical and hence quantitative literacy.
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*) ☐ in-depth ☐ minimally ☒ not addressed	☒ no changes ☐ revised
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*) ☒ in-depth ☐ minimally ☐ not addressed	☒ no changes ☐ revised Outcome 4: Adapt statistical techniques and reasoning to other disciplines and vocations. Statistical thinking, uncovering the regular in the irregular, inferring the general from the particular, is often the only means for discovering the noise-obscured consequences of human action on the social and natural world (and the noisy action of the social and natural world on humans).

Section # 4 Department Review

This proposal has been reviewed at the Director level and approved for submission.

Department Chair	Email	Date
John Evans	jevans@cgcc.edu	1.29.18
Department Director	**Email**	**Date**
Mary Kramer	mkramer@cgcc.edu	1.29.28

NEXT STEPS:

1. Save this document as the course prefix and course number.gened (e.g. HST 104.gened). Send completed form electronically to curriculum@cgcc.edu.
2. Complete the Course Signature form found in Forms on the curriculum website. Obtain required electronic or inked signatures and deliver to curriculum office by posted deadline. Refer to the curriculum office website for the

Statistics II

Course Number: MTH 244
Transcript Title: Statistics II
Created: September 1, 2012
Updated: June 7, 2017
Total Credits: 5
Lecture Hours: 50
Lecture / Lab Hours: 0
Lab Hours: 0
Satisfies Cultural Literacy requirement: No
Satisfies General Education requirement: Yes
Grading options: A-F (default), P-NP, audit
Repeats available for credit: 0

Prerequisites
MTH 243 (/courses/mth-243)

Course Description

Investigates confidence interval estimation; tests of significance including z-tests, t-tests, ANOVA, and chi-square; and inference for linear regression. Applications are investigated from science, business, and social science perspectives. Graphing calculator with advanced statistical programs required and/or computer software. Prerequisites: MTH 243 and its prerequisite requirements. Audit available.

Intended Outcomes

Upon successful completion of this course, students will be able to:

1. Statistically analyze observational and experimental studies and critically assess results from the same.
2. Clearly communicate statistical procedures and results.
3. Read with understanding scholarly publications and critically assess public dissemination of statistical information.
4. Adapt statistical techniques and reasoning to other disciplines and vocations.

Alignment with Institutional Core Learning Outcomes

In-depth	1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. *(Communication)*
In-depth	2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. *(Critical thinking and Problem-Solving)*
	3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. *(Quantitative Literacy)*
Not Addressed	4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. *(Cultural Awareness)*
Minimally	5. Recognize the consequences of human activity upon our social and natural world. *(Community and Environmental Responsibility)*

Outcome Assessment Strategies

Assessment shall include some combination of the following:

- Class participation
- Group projects
- Presentations

- Portfolios
- Research papers
- Homework assignments
- Written paper
- Quizzes
- Exams
- Other assessments of the instructors choosing

Course Activities and Design

Concepts will be introduced using lecture, group activities, calculator and/or computer programs, and computer laboratory explorations. Students will communicate their results orally and in writing.

Course Content (Themes, Concepts, Issues and Skills)

1.0 RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS
The instructional goal is to explore and analyze various random variables and probability distributions.

1.1 Explore probability distributions:

1.1.1 Normal.
1.1.2 Student's t.
1.1.3 F.
1.1.4 Chi-square.

2.0 ESTIMATION: ONE SAMPLE
The instructional goal is to estimate a population parameter by calculating a confidence interval.

2.1 Identify and describe terminology:

2.1.1 Confidence coefficient.
2.1.2 Confidence level.
2.1.3 Confidence interval.

2.2 Check the conditions associated with a confidence interval for a population mean.
2.3 Check the conditions associated with a confidence interval for a population proportion.
2.4 Calculate and interpret a confidence interval for a population mean.
2.5 Calculate and interpret a confidence interval for a population proportion.
2.6 Calculate a sample size to attain a desired margin of error and confidence level.
2.7 Using technology, input a sample and execute the commands to create a confidence interval; interpret the output.

3.0 STATISTICAL INFERENCE: ONE SAMPLE
The goal is to utilize sample information to test whether a population parameter is less than, not equal to, or greater than a specified value.

3.1 Perform a two-sided test using:

3.1.1 A test of significance.
3.1.2 A confidence interval.

3.2 Calculate sample size.
3.3 Identify and describe terminology:

3.3.1 Null and alternative hypotheses.
3.3.2 Test statistic.
3.3.3 Distinguish between significance and hypothesis testing
3.3.4 Type I and Type II errors, α and β.
3.3.5 Observed significance level: P-value.

3.4 Check the conditions associated with a test of significance about a population mean.
3.5 Check the conditions associated with a test of significance about a population proportion.
3.6 Construct and interpret a z-test about a population mean.
3.7 Construct and interpret a t-test about a population mean.
3.8 Construct and interpret a z-test about a population proportion.
3.9 Using technology, input a sample and execute the commands to perform a t-test or a z-test; interpret the output.
3.10 Calculate and interpret the power of a z-test.

4.0 ESTIMATION AND STATISTICAL INFERENCE: TWO SAMPLES
The instructional goal is to utilize sample information to infer whether a difference exists between two population means or two population proportions.

4.1 Perform a two-sided test using:

4.1.1 A test of significance.
4.1.2 A confidence interval.

4.2 Check the conditions associated with a confidence interval or test of significance about the difference between two population means using two independent samples.
4.3 Check the conditions associated with a confidence interval or test of significance about the difference between two population proportions using two independent samples.
4.4 Check the conditions associated with a confidence interval or test of significance about the mean difference between two populations using paired samples.
4.5 Construct and interpret a confidence interval about the difference between two population means using two independent samples.
4.6 Construct and interpret a t-test about the difference between two population means using two independent samples.
4.7 Construct and interpret a confidence interval about the difference between two population proportions using two independent samples.
4.8 Construct and interpret a z-test about the difference between two population proportions using two independent samples.
4.9 Construct and interpret a confidence interval about the mean difference between two populations using paired samples.
4.10 Construct and interpret a t-test about the mean difference between two populations using paired samples.
4.11 Using technology, input two independent samples and execute the commands to perform a two-sample difference of means confidence interval; interpret the output.
4.12 Using technology, input two independent samples and execute the commands to perform a two-sample difference of means test; interpret the output.
4.13 Using technology, input two independent samples and execute the commands to perform a two-sample difference of proportions confidence interval; interpret the output.
4.14 Using technology, input two independent samples and execute the commands to perform a two-sample difference of proportions test; interpret the output.
4.15 Using technology, input two paired samples and execute the commands to perform a one-sample confidence interval; interpret the output.
4.16 Using technology, input two paired samples and execute the commands to perform a one-sample t-test; interpret the output.

5.0 ANALYSIS OF VARIANCE (ANOVA)
The instructional goal is to design and analyze a sampling experiment to compare the means of more than two populations.

5.1 Identify and describe terminology:

5.1.1 Response (dependent) variable.
5.1.2 Factor (independent variable, stimulus).
5.1.3 Levels (treatments) of a factor.
5.1.4 Sum of squares for treatments (SST) and error (SSE).
5.1.5 Mean square for treatments (MST) and error (MSE).

5.2 Check the conditions associated with an ANOVA test.
5.3 Compare the treatment means.
5.4 Summarize the results of the F test in an ANOVA table.
5.5 Using technology, input sample data and execute the commands to perform ANOVA; interpret the output.
5.6 Use a multiple comparisons method to determine which pairs of means differ; interpret the results.

6.0 CHI-SQUARE TESTS AND CONTINGENCY TABLES
The instructional goal is to explore a non-parametric procedure on categorical variables.

6.1 Identify and describe terminology:

6.1.1 Multinomial probabilities.
6.1.2 Contingency table.
6.1.3 Marginal probabilities.

6.2 Check the conditions associated with a goodness-of-fit test.
6.3 Check the conditions associated with a test of independence.
6.4 Check the conditions associated with a test of homogeneity.
6.5 Perform a goodness-of-fit test about the probability distribution of a random variable.
6.6 Determine whether two classifications of nominal data are independent using a contingency table, multinomial probabilities, and a chi-square test.
6.7 Using technology, input sample data, choose commands to perform an appropriate chi-square test; interpret the output.

7.0 SIMPLE LINEAR REGRESSION AND CORRELATION
The instructional goal is to explore a straight-line relationship between two random variables, and use the least-squares line as a basis for inference about a population from which our observations are a sample.

7.1 Identify the explanatory variable and the response variable.
7.2 Check the conditions associated with constructing a least-squares linear regression model.

7.3 Construct a scatterplot of the sample data.
7.4 Identify the least-squares estimates of the intercept and the slope (the parameters) of the population regression model.
7.5 Specify the probability distribution of the random error term, and estimate the standard deviation of this distribution.
7.6 Evaluate the utility of the model:

7.6.1 Conduct a test of significance to determine whether the data provide sufficient evidence to indicate that the explanatory variable contributes information for the linear prediction of the response variable.
7.6.2 Construct and interpret a confidence interval to estimate the slope of the population regression model.
7.6.3 Calculate and interpret the sample correlation coefficient r.
7.6.4 Calculate and interpret the coefficient of determination r^2.

7.7 Use the least-squares line for estimation and prediction:

7.7.1 Construct and interpret a confidence interval for the mean value of the response value when the explanatory variable takes on a specific value.
7.7.2 Construct and interpret a prediction interval for an individual value of the response value when the explanatory variable takes on a specific value.

7.8 Using technology, input sample data and execute the commands to produce a least-squares regression equation, a fitted line, a residual plot, and r^2; interpret the output.

Department Notes

This is the second term of a two-term sequence (MTH 243 and MTH 244). This course is intended to provide an introduction to statistics in a data-based setting.

CC date _____
CC decision _____
CC vote _____

Columbia Gorge Community College

General Education/Discipline Studies List Request Form

(Double click on check boxes to activate dialog box)

1. General & Course Information:			
Department	Math	Submitter Name: Phone: Email:	John Evans 541 – 506 - 6172 jevans@cgcc.edu
Course Prefix and Number:	MTH 251	Course Title:	Calculus I
Course Credits:	5	Gen Ed Category:	☐ Arts and Letters ☐ Social Science ☒ Science, Comp. Sci., and Math
Course Description:	Includes limits, continuity, derivatives and applications. Graphing calculator required, TI-89 or other CAS calculator recommended. Prerequisites: MTH 112, WR 115. Audit available.		
Course Outcomes:	1. Recognize applications in which the concept of limits and derivatives can aid in overall understanding.		
	2. Construct appropriate models using limits and derivatives.		
	3. Accurately compute results from models through the appropriate use of technology, limits, derivatives and algebra.		
	4. Analyze and effectively communicate results within a mathematical context.		

Lower Division Collegiate (LDC) courses that apply for General Education/Discipline Studies status must:

1. **Be available to all CGCC students who meet the prerequisites for the course.**
2. **Ensure that the appropriate AAOT Discipline Studies outcomes and criteria are reflected in the course's outcomes.** (If you need to revise your course outcomes, you must complete a Course Revision form.)
3. **Verify course transfer status using the Course Transfer/Articulation Status form** (available on the curriculum website)**.** In order to obtain general education status, at least two OUS schools must confirm the course will transfer and one of the schools must approve the transfer as general education.
4. **Have the Standard Prerequisites unless the Department Chair has completed the Prerequisite Opt-Out form and that request is approved.**
5. **Be an LDC course that is eligible for the AAOT Discipline Studies List.**

In addition, course content must address the following:

1. **CGCC's General Education Philosophy Statement:** *Through a broad, well-balanced curriculum, the General Education program strives to instill a lifelong love of learning and to foster civic competence within our students.*
2. **CGCC Core Learning Outcomes (CLO):**
   Through their respective disciplines, CGCC students who earn a degree can:
   1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*)
   2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*)
   3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*)

4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*)
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*)

Course outcomes and content are required, at a minimum, to demonstrate that CLOs 1 (*Communication*) and 2 (*Critical Thinking and Problem Solving*) are addressed in depth, and 1 additional CLO is addressed at least minimally.

2. Address CGCC Core Learning Outcomes:	
For each CLO addressed, provide the following: 1) list the course outcome(s) that clearly reflects the CLO; and 2) describe relevant course content, outlining how students will gain the skills and knowledge needed to achieve a level of mastery of the CLO. Please check the appropriate box, "no changes" or "revised," noting whether your response has changed since your last Gen Ed Request submission. Include previous response even if you are not making any revisions.	
Gen Ed designated courses are required to address CLOs 1 and 2 "in-depth."	
1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*) ☒ in-depth **REQUIRED**	Analyze and effectively communicate results within a mathematical context. Effective communication of results is a constant theme throughout the entire course, and particularly the last section on applications. The first topic is limits, and the first thing students are taught is how to say them, verbally and aloud. Students are required to answer all application problems (examples include related rates and optimization)in complete sentences and include correct units. The projects in this class are writing assignments. And more generally all work and results must be presented clearly.
2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*) ☒ in-depth **REQUIRED**	Recognize applications in which the concept of limits and derivatives can aid in overall understanding. Construct appropriate models using limits and derivatives. Accurately compute results from models through the appropriate use of technology, limits, derivatives and algebra. Analyze and effectively communicate results within a mathematical context. A typical problem from calculus I would ask a student to find the dimensions of a container that minimize the cost given a desired volume. Different information is then given, including the size. To solve such a problem the student might need to research the appropriate formula for the volume of such a shape, reason through the long and complicated process of developing a function that models this cost. Next the student will need to use tools learned in this class to minimize the function for cost. Part of this process is to show (applies to communication above as well) that the solution they propose really is the minimum. Finally they must communicate clearly the solution to the original problem (which again relates to communication above.)
Provide a response for each of the following three CLOs that your course addresses. **Gen Ed designated courses are required, at a minimum, to address one of these three "minimally" or "in-depth."**	

3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*) ☒ in-depth ☐ minimally ☐ not addressed	1. Recognize applications in which the concept of limits and derivatives can aid in overall understanding. 2. Construct appropriate models using limits and derivatives. 3. Accurately compute results from models through the appropriate use of technology, limits, derivatives, and algebra. 4. Analyze and effectively communicate results within a mathematical context. All of these speak to this CLO. This is the core of math. The main difference from one math course to another is the tools we develop and use in this process, and the level of abstraction or detail included. A typical application from calculus one might involve collecting data on revenue generated versus price charged, developing a function to describe this data, then finding the maximum revenue as a function of price.
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*) ☐ in-depth ☐ minimally ☒ not addressed	☒ no changes ☐ revised
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*) ☐ in-depth ☒ minimally ☐ not addressed	☒ no changes ☐ revised • Recognize applications in which the concept of limits and derivatives can aid in overall understanding. • Construct appropriate models using limits and derivatives Creating a mathematical model is a human activity, and has consequences for our social and natural world. The project for this class is to show how calculus is used in some application of interest to the student. This alone shows its impact on the world around them. A typical example from calculus I might be a growth model. For example a function to model the population growth of The Dalles since the year 2010. Students would then study such concepts as doubling time, average rate of change, and particularly instantaneous rates of change. Also important are the affects of our assumptions on the model itself, and the difference between the mathematically correct answer and the actual population at any time. These all reflect the consequences of human activity.

Section # 4 Department Review

This proposal has been reviewed at the Director level and approved for submission.

Department Chair	Email	Date
John Evans	jevans@cgcc.edu	01/26/18
Department Director	**Email**	**Date**
Mary Kramer	mkramer@cgcc.edu	1.29.18

Calculus I

Course Number: MTH 251
Transcript Title: Calculus I
Created: September 1, 2012
Updated: June 7, 2017
Total Credits: 5
Lecture Hours: 50
Lecture / Lab Hours: 0
Lab Hours: 0
Satisfies Cultural Literacy requirement: No
Satisfies General Education requirement: Yes
Grading options: A-F (default), P-NP, audit
Repeats available for credit: 0

Prerequisites
MTH 112 (/courses/mth-112)

Course Description

Includes limits, continuity, derivatives and applications. Graphing calculator required, TI-89 or other CAS calculator recommended. Prerequisites: MTH 112. Audit available.

Intended Outcomes

Upon successful completion of this course, students will be able to:

1. Recognize applications in which the concept of limits and derivatives can aid in overall understanding.
2. Construct appropriate models using limits and derivatives.
3. Accurately compute results from models through the appropriate use of technology, limits, derivatives and algebra.
4. Analyze and effectively communicate results within a mathematical context.

Alignment with Institutional Core Learning Outcomes

In-depth	1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. *(Communication)*
In-depth	2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. *(Critical thinking and Problem-Solving)*
	3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. *(Quantitative Literacy)*
Not Addressed	4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. *(Cultural Awareness)*
Minimally	5. Recognize the consequences of human activity upon our social and natural world. *(Community and Environmental Responsibility)*

Outcome Assessment Strategies

At least one project plus some combination of the following:

- Class participation
- Group projects
- Presentations
- Portfolios

- Research papers
- Homework assignments
- Written paper
- Quizzes
- Exams
- Other assessments of the instructors choosing

Course Activities and Design

This course will be delivered through a combination of lecture and student activities including group and individual problem solving during class. Emphasis is to be given to applications from outside the mathematics classroom. Applications will come from the broadest possible range of disciplines.

Course Content (Themes, Concepts, Issues and Skills)

1. Limits
   a. Introduction – instantaneous rate of change and the need for limits
   b. One and two-sided limits; Squeeze Theorem
   c. Continuity and The Intermediate Value Theorem
   d. Limit Theorems and Evaluating Limits
   e. Limits at infinity and infinity as a limit
   f. Limit definition of derivative
   g. Derivatives as functions; Higher order derivatives
   h. Derivatives and the shape of graphs
2. Derivatives
   a. Derivatives of polynomials and the binomial expansion theorem
   b. Derivative of the exponential function
   c. Derivative Theorems; Product Rule – Quotient Rule
   d. Derivatives of Trig functions
   e. Chain Rule
   f. Implicit Differentiation
   g. Derivatives of inverse functions; Derivative of Cosh and Sinh
   h. Tangent line approximations and differentials
3. Applications
   a. Related Rates
   b. Extreme Value Theorem and closed interval problems.
   c. First and Second Derivative Tests
   d. Calculus and Graphing
   e. Mean Value Theorem for Derivatives
   f. L'Hospital's Rule
   g. Newton's Method
   h. Optimization

Department Notes

Answers to all application problems will be given in complete sentences with correct units. The grade will include at least one project.

CC date _____
CC decision _____
CC vote _____

Columbia Gorge Community College

General Education/Discipline Studies List Request Form

(Double click on check boxes to activate dialog box)

1. General & Course Information:			
Department	Math	Submitter Name: Phone: Email:	John Evans 541 – 506 – 6172 jevans@cgcc.edu
Course Prefix and Number:	MTH 252	Course Title:	Calculus II
Course Credits:	5	Gen Ed Category:	☐ Arts and Letters ☐ Social Science ☒ Science, Comp. Sci., and Math
Course Description:	Includes anti-derivatives and integrals, definite and improper integrals, and applications including direct application of integration and solving basic differential equations. Graphing calculator required, TI-89 or other CAS calculator recommended. Prerequisites: MTH 251 and its prerequisite requirements. Audit available.		
Course Outcomes:	Upon successful completion of this course, students will be able to:		
	1. Recognize applications in which the concept of differentiation or integration can aid in overall understanding.		
	2. Construct appropriate models using definite, indefinite, or improper integrals, or basic differential equations.		
	3. Accurately compute results from models through the appropriate use of technology, algebra or calculus.		
	4. Analyze and effectively communicate results within a mathematical context.		

Lower Division Collegiate (LDC) courses that apply for General Education/Discipline Studies status must:

1. **Be available to all CGCC students who meet the prerequisites for the course.**
2. **Ensure that the appropriate AAOT Discipline Studies outcomes and criteria are reflected in the course's outcomes.** (If you need to revise your course outcomes, you must complete a Course Revision form.)
3. **Verify course transfer status using the Course Transfer/Articulation Status form** (available on the curriculum website)**.** In order to obtain general education status, at least two OUS schools must confirm the course will transfer and one of the schools must approve the transfer as general education.
4. **Have the Standard Prerequisites unless the Department Chair has completed the Prerequisite Opt-Out form and that request is approved.**
5. **Be an LDC course that is eligible for the AAOT Discipline Studies List.**

In addition, course content must address the following:

1. **CGCC's General Education Philosophy Statement:** *Through a broad, well-balanced curriculum, the General Education program strives to instill a lifelong love of learning and to foster civic competence within our students.*
2. **CGCC Core Learning Outcomes (CLO):**
   Through their respective disciplines, CGCC students who earn a degree can:
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2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*)
3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*)
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*)
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*)

Course outcomes and content are required, at a minimum, to demonstrate that CLOs 1 (*Communication*) and 2 (*Critical Thinking and Problem Solving*) are addressed in depth, and 1 additional CLO is addressed at least minimally.

2. Address CGCC Core Learning Outcomes:	
For each CLO addressed, provide the following: 1) list the course outcome(s) that clearly reflects the CLO; and 2) describe relevant course content, outlining how students will gain the skills and knowledge needed to achieve a level of mastery of the CLO. Please check the appropriate box, "no changes" or "revised," noting whether your response has changed since your last Gen Ed Request submission. Include previous response even if you are not making any revisions.	
Gen Ed designated courses are required to address CLOs 1 and 2 "in-depth."	
1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised 2. Construct appropriate models using definite, indefinite, or improper integrals, or basic differential equations. 4. Analyze and effectively communicate results within a mathematical context. In this course students learn how to construct models involving integrals in order to solve a variety of real world problems. They are taught to construct the models and communicate both how they did the construction and the results of that rather than simply memorize and apply formulas. Clear communication of the results is emphasized at every step, and actually represents a serious challenge to students in summarizing and concluding possibly several pages of high level mathematics.
2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised 2. Construct appropriate models using definite, indefinite, or improper integrals, or basic differential equations. 3. Accurately compute results from models through the appropriate use of technology, algebra or calculus. 4. Analyze and effectively communicate results within a mathematical context. All of the content in this class revolves around problem solving. First we learn how to evaluate integrals (heavy problem solving) then we learn how to use integrals to solve a wide variety of problems from many different fields including physics, engineering, biology, business, and many others.

Provide a response for each of the following three CLOs that your course addresses. Gen Ed designated courses are required, at a minimum, to address one of these three "minimally" or "in-depth."	
3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*) ☒ in-depth ☐ minimally ☐ not addressed	• Construct appropriate models using definite, indefinite, or improper integrals, or basic differential equations. • Accurately compute results from models through the appropriate use of technology, algebra or calculus. • Analyze and effectively communicate results within a mathematical context. Many of the same verbs are used in our course outcomes as in this CLO. This is the heart of mathematics. The main difference from one class to another is the tools we learn and use, the number of simplifying assumptions made, and the level of expectation, which generally rises as students progress.
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*) ☐ in-depth ☐ minimally ☒ not addressed	☐ no changes ☐ revised
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*) ☐ in-depth ☒ minimally ☐ not addressed	☒ no changes ☐ revised 1. Recognize applications in which the concept of differentiation or integration can aid in overall understanding. While the focus of the class is on developing skill in creating models, evaluating these models, and communicating the results in mathematically acceptable ways, students also are encouraged to consider the consequences of the technology they use and develop on how they live their lives. For example, in a recent year Math Awareness Month (always April) was themed the future of prediction. One of the articles dealt with self-driving cars. In class we discussed the impact this would have on our sense of privacy as cars must know where each other are in order for there to be a benefit to self-driving cars.

Section # 4 Department Review		
This proposal has been reviewed at the Director level and approved for submission.		
Department Chair	Email	Date
John Evans	jevans@cgcc.edu	01/26/18
Department Director	Email	Date
Mary Kramer	mkramer@cgcc.edu	1.29.18

NEXT STEPS:

Calculus II

Course Number: MTH 252
Transcript Title: Calculus II
Created: September 1, 2012
Updated: October 25, 2017
Total Credits: 5
Lecture Hours: 50
Lecture / Lab Hours: 0
Lab Hours: 0
Satisfies Cultural Literacy requirement: No
Satisfies General Education requirement: Yes
Grading options: A-F (default), P-NP, audit
Repeats available for credit: 0

Prerequisites
MTH 251 and its prerequisite requirements.

Course Description

Includes anti-derivatives and integrals, definite and improper integrals, and applications including direct application of integration and solving basic differential equations. Graphing calculator required, TI-89 or other CAS calculator recommended.Prerequisites: MTH 251 and its prerequisite requirements. Audit available.

Intended Outcomes

Upon successful completion of this course, students will be able to:

1. Recognize applications in which the concept of differentiation or integration can aid in overall understanding.
2. Construct appropriate models using definite, indefinite, or improper integrals, or basic differential equations.
3. Accurately compute results from models through the appropriate use of technology, algebra or calculus.
4. Analyze and effectively communicate results within a mathematical context.

Alignment with Institutional Core Learning Outcomes

In-depth	1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. *(Communication)*
In-depth	2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. *(Critical thinking and Problem-Solving)*
	3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. *(Quantitative Literacy)*
Not Addressed	4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. *(Cultural Awareness)*
Minimally	5. Recognize the consequences of human activity upon our social and natural world. *(Community and Environmental Responsibility)*

Outcome Assessment Strategies

At least one project plus some combination of the following:

- Class participation
- Group projects
- Presentations

- Portfolios
- Research papers
- Homework assignments
- Written paper
- Quizzes
- Exams
- Other assessments of the instructors choosing

Course Activities and Design

This course will be delivered through a combination of lecture and student activities including group and individual problem solving during class. Emphasis is to be given to applications from outside the mathematics classroom. Applications will come from the broadest possible range of disciplines.

Course Content (Themes, Concepts, Issues and Skills)

1. Integration
   - Considering the question of area – using limits
   - The definite integral
   - Fundamental Theorem of Calculus
   - Anti-derivatives and indefinite integrals
   - Techniques of integration:
     - substitution
     - integration by parts
     - trigonometric integrals/trig substitution/partial fractions
   - Numerical Integration and approximation
   - Improper Integrals
2. Applications using Integration Directly
   - Area under and between functions
   - Volumes:
     - Rotation about the x-axis
     - Rotation about the y-axis
     - Slicing
   - Arc-length and Surface Area
   - Mean Value Theorem for Integrals
   - Work
   - Force of Water Behind a Dam
   - Centroids and Center of Mass
   - Statistics
   - Applications of Integration in Business
   - Other Applications of Integration
3. Applications of Integration in solving Basic Differential Equations
   - What are differential equations?
   - Differential Equations and Assumptions about Growth
   - Slope Fields
   - Solutions
   - Separable Differential Equations
   - Continuous Growth Model
   - Logistics Model
   - Phase Diagrams
   - Predator-Prey Model

Department Notes

Answers to all application problems will be given in complete sentences with correct units. The grade will include at least one project.

CC date _____
CC decision _____
CC vote _____

Columbia Gorge Community College

General Education/Discipline Studies List Request Form

(Double click on check boxes to activate dialog box)

1. General & Course Information:			
Department	Math	Submitter Name: Phone: Email:	John Evans 541 – 506 – 6172 jevans@cgcc.edu
Course Prefix and Number:	MTH 253	Course Title:	Calculus III
Course Credits:	5	Gen Ed Category:	☐ Arts and Letters ☐ Social Science ☒ Science, Comp. Sci., and Math
Course Description:	Includes infinite sequences and series, Taylor series and applications, equations of lines and planes in three dimensions, vectors in 3D, and differentiation and integration of vector valued functions with applications. Graphing calculator required; TI-89 or access to CAS recommended. Prerequisites: MTH 252 and its prerequisite requirements. Audit available.		
Course Outcomes:	1. Recognize the fundamental role that power series plays in machine calculation and modern computing in general.		
	2. Recognize applications in which the concepts of power series, vectors, or vector valued functions can aid in overall understanding.		
	3. Accurately compute results from models based on infinite series or vector valued functions.		
	4. Analyze and effectively communicate results within a mathematical context.		

Lower Division Collegiate (LDC) courses that apply for General Education/Discipline Studies status must:

1. **Be available to all CGCC students who meet the prerequisites for the course.**
2. **Ensure that the appropriate AAOT Discipline Studies outcomes and criteria are reflected in the course's outcomes.** (If you need to revise your course outcomes, you must complete a Course Revision form.)
3. **Verify course transfer status using the Course Transfer/Articulation Status form** (available on the curriculum website)**.** In order to obtain general education status, at least two OUS schools must confirm the course will transfer and one of the schools must approve the transfer as general education.
4. **Have the Standard Prerequisites unless the Department Chair has completed the Prerequisite Opt-Out form and that request is approved.**
5. **Be an LDC course that is eligible for the AAOT Discipline Studies List.**

In addition, course content must address the following:

1. **CGCC's General Education Philosophy Statement:** *Through a broad, well-balanced curriculum, the General Education program strives to instill a lifelong love of learning and to foster civic competence within our students.*
2. **CGCC Core Learning Outcomes (CLO):**
   Through their respective disciplines, CGCC students who earn a degree can:
   1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*)
   2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*)

3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*)
4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*)
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*)

Course outcomes and content are required, at a minimum, to demonstrate that CLOs 1 (*Communication*) and 2 (*Critical Thinking and Problem Solving*) are addressed in depth, and 1 additional CLO is addressed at least minimally.

2. Address CGCC Core Learning Outcomes:	
For each CLO addressed, provide the following: 1) list the course outcome(s) that clearly reflects the CLO; and 2) describe relevant course content, outlining how students will gain the skills and knowledge needed to achieve a level of mastery of the CLO. Please check the appropriate box, "no changes" or "revised," noting whether your response has changed since your last Gen Ed Request submission. Include previous response even if you are not making any revisions.	
Gen Ed designated courses are required to address CLOs 1 and 2 "in-depth."	
1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. (*Communication*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised Analyze and effectively communicate results within a mathematical context. Roughly half of the course focuses on infinite sequences and series. Our main goal is to be able to decide if these converge or not. Most of it involves communicating both the conclusion and the means for arriving at that conclusion.
2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. (*Critical Thinking and Problem-Solving*) ☒ in-depth **REQUIRED**	☒ no changes ☐ revised All course outcomes relate to this. As with Calculus II this entire class is geared at creating models, evaluating results from these models, and effectively communicating those results.
Provide a response for each of the following three CLOs that your course addresses. Gen Ed designated courses are required, at a minimum, to address one of these three "minimally" or "in-depth."	
3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. (*Quantitative Literacy*) ☒ in-depth ☐ minimally ☐ not addressed	All course outcomes relate to this. As with Calculus II this entire class is geared at creating models, evaluating results from these models, and effectively communicating those results. Models that come from quantitative information in a variety of forms.

4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. (*Cultural Awareness*) ☐ in-depth ☐ minimally ☐ not addressed	☐ no changes ☐ revised
5. Recognize the consequences of human activity upon our social and natural world. (*Community and Environmental Responsibility*) ☐ in-depth ☒ minimally ☐ not addressed	☒ no changes ☐ revised 1. Recognize the fundamental role that power series plays in machine calculation and modern computing in general. 2. Recognize applications in which the concepts of power series, vectors, or vector valued functions can aid in overall understanding. While the focus of the class is on developing skill in creating models, evaluating these models, and communicating the results in mathematically acceptable ways, students also are encouraged to consider the consequences of the technology they use and develop on how they live their life.

Section # 4 Department Review		
This proposal has been reviewed at the Director level and approved for submission.		
Department Chair	Email	Date
John Evans	jevans@cgcc.edu	01/26/18
Department Director	Email	Date
Mary Kramer	mkramer@cgcc.edu	1.29.18

NEXT STEPS:

1. Save this document as the course prefix and course number.gened (e.g. HST 104.gened). Send completed form electronically to curriculum@cgcc.edu.
2. Complete the Course Signature form found in Forms on the curriculum website. Obtain required electronic or inked signatures and deliver to curriculum office by posted deadline. Refer to the curriculum office website for the Curriculum Committee meeting schedule and submission deadlines. You are encouraged to send submissions prior to the deadline so that the curriculum office may review and provide feedback.
3. Submission will be placed on the next agenda with available time slots. You will be notified of your submission's time for review. It is not mandatory that you attend the Curriculum Committee meeting in which your submission is scheduled for review; however, it is strongly encouraged that you attend so that you may represent your submission and respond to any committee questions. Unanswered questions may result in a submission being rescheduled for

Calculus III

Course Number: MTH 253
Transcript Title: Calculus III
Created: September 1, 2012
Updated: October 25, 2017
Total Credits: 5
Lecture Hours: 50
Lecture / Lab Hours: 0
Lab Hours: 0
Satisfies Cultural Literacy requirement: No
Satisfies General Education requirement: Yes
Grading options: A-F (default), P-NP, audit
Repeats available for credit: 0

Prerequisites
MTH 252 and its prerequisite requirements.

Course Description

Includes infinite sequences and series, Taylor series and applications, equations of lines and planes in three dimensions, vectors in 3D, and differentiation and integration of vector valued functions with applications. Graphing calculator required; TI-89 or access to CAS recommended. Prerequisites: MTH 252 and its prerequisite requirements. Audit available.

Intended Outcomes

Upon successful completion of this course, students will be able to:

1. Recognize the fundamental role that power series plays in machine calculation and modern computing in general.
2. Recognize applications in which the concepts of power series, vectors, or vector valued functions can aid in overall understanding.
3. Accurately compute results from models based on infinite series or vector valued functions.
4. Analyze and effectively communicate results within a mathematical context.

Alignment with Institutional Core Learning Outcomes

In-depth	1. Communicate effectively using appropriate reading, writing, listening, and speaking skills. *(Communication)*
In-depth	2. Creatively solve problems by using relevant methods of research, personal reflection, reasoning, and evaluation of information. *(Critical thinking and Problem-Solving)*
	3. Extract, interpret, evaluate, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in their academic, professional and private lives. *(Quantitative Literacy)*
Not Addressed	4. Appreciate cultural diversity and constructively address issues that arise out of cultural differences in the workplace and community. *(Cultural Awareness)*
Minimally	5. Recognize the consequences of human activity upon our social and natural world. *(Community and Environmental Responsibility)*

Outcome Assessment Strategies

At least one project plus some combination of the following:

- Class participation
- Group projects
- Presentations

- Portfolios
- Research papers
- Homework assignments
- Written paper
- Quizzes
- Exams
- Other assessments of the instructors choosing

Course Activities and Design

This course will be delivered through a combination of lecture and student activities including group and individual problem solving during class. Emphasis is to be given to applications from outside the mathematics classroom. Applications will come from the broadest possible range of disciplines.

Course Content (Themes, Concepts, Issues and Skills)

1. Infinite Sequences and Series
   - Sequences
   - Series
   - Integral and Comparison Tests
   - Other Tests
   - Power Series
   - Representation of Functions as a Power Series
   - Taylor and Maclaurin Series
   - Applications
2. Vectors and Geometry of Space
   - Three-Dimensional Coordinate Systems
   - Vectors
   - The Dot and Cross Products
   - Equations of Lines and Planes in Space
   - Functions and Surfaces
   - Cylindrical and Spherical Coordinates
3. Vector Values Functions
   - Vector Functions and Space Curves
   - Derivatives and Integrals of Vector Functions
   - Arc Length and Curvature
   - Motion in Space: Velocity and Acceleration
   - Parametric Surfaces

Department Notes

Answers to all application problems will be given in complete sentences with correct units. The grade will include at least one project.